(No Model.) 2 Sheets—Sheet 1.

I. T. SMITH.

MACHINE FOR POLISHING THE EYES OF NEEDLES.

No. 255,044. Patented Mar. 14, 1882.

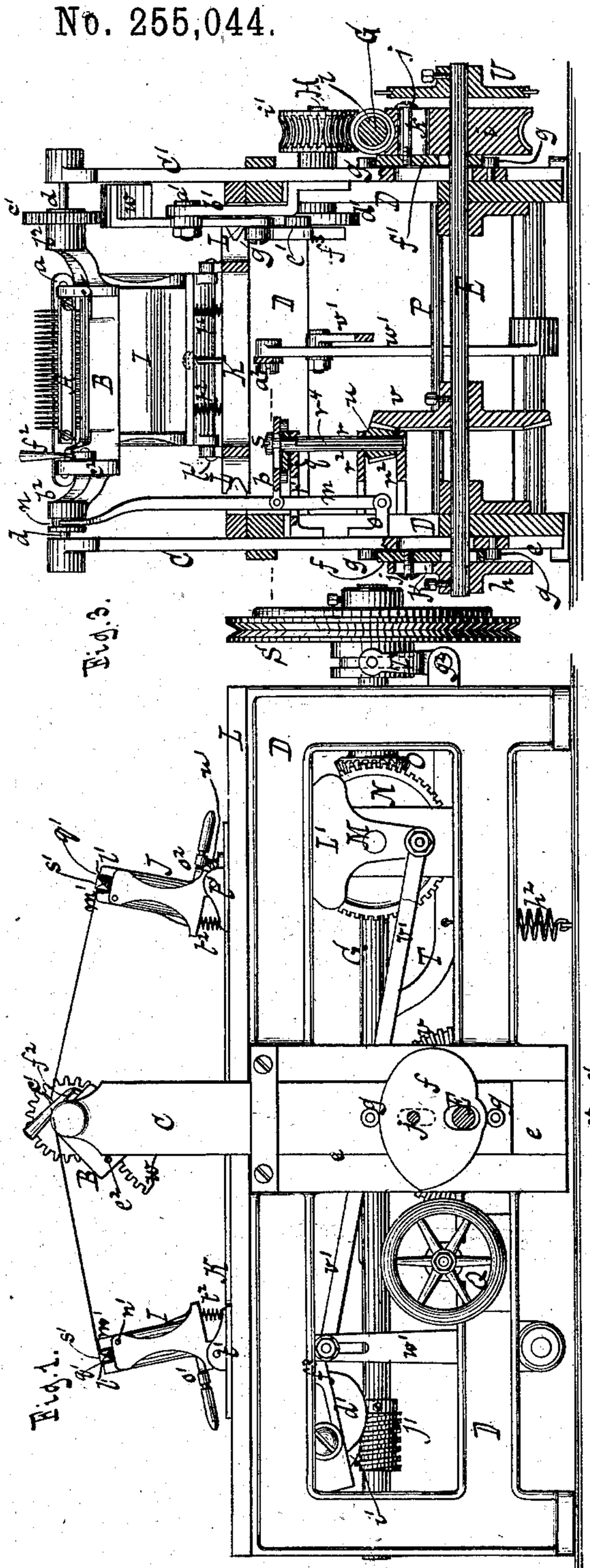

Fig. 3.

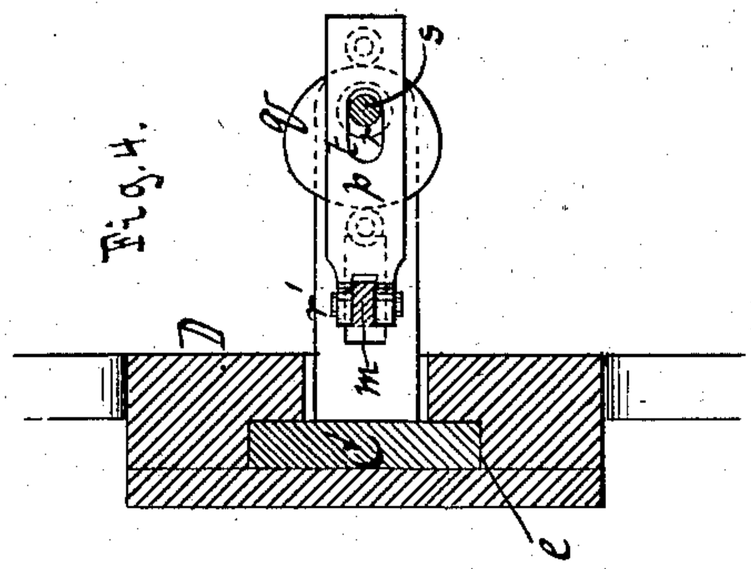

Fig. 4.

Fig. 1.

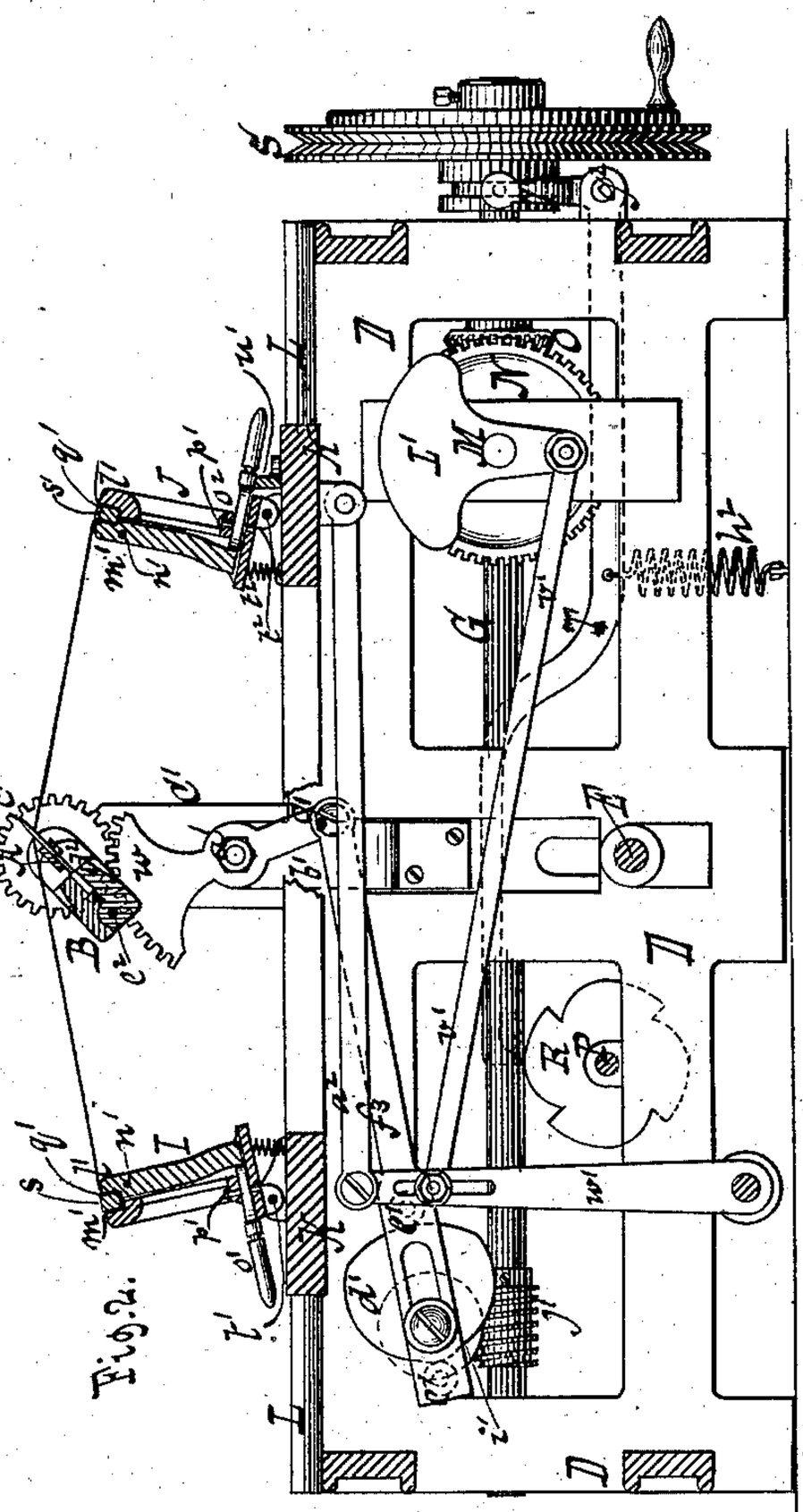

Fig. 2.

Witnesses
Otto Hufeland
William Miller

Inventor
Ira T Smith.
by Van Santvoord & Hauff
his attys.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 6.

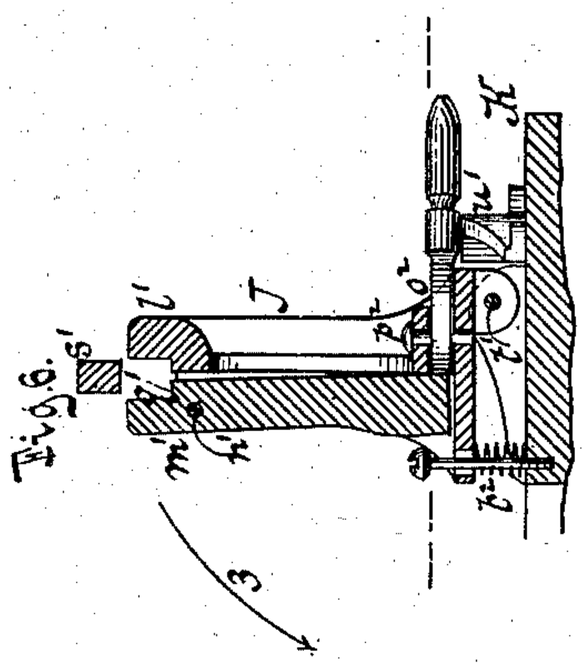


Fig. 7.

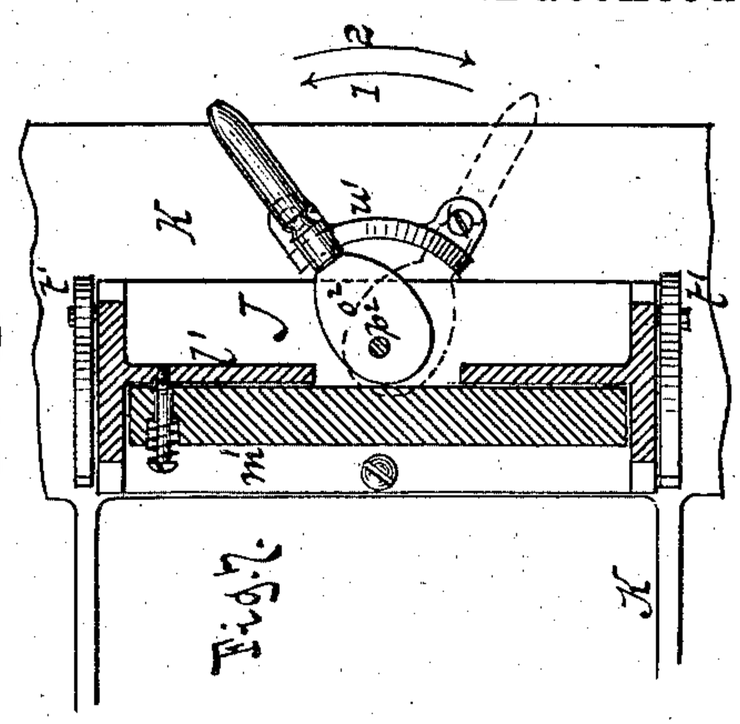


Fig. 8.

Fig. 9.

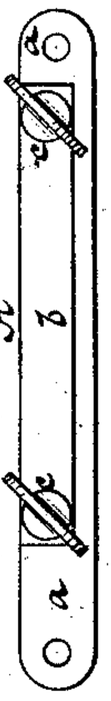
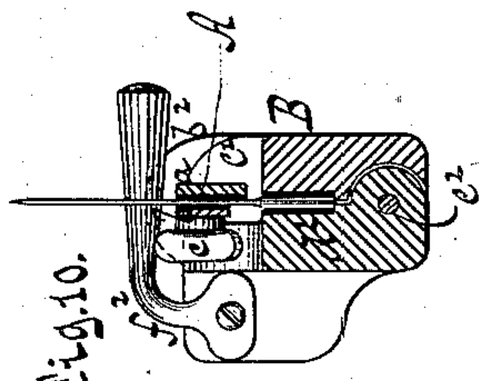


Fig. 5.

Fig. 10.



Witnesses
~~Otto~~ Schofield
William Miller

Inventor
Ira. T. Smith
by Van Santvoord & Hauff
his attys.

UNITED STATES PATENT OFFICE.

IRA T. SMITH, OF MOUNT CARMEL, CONNECTICUT.

MACHINE FOR POLISHING THE EYES OF NEEDLES.

SPECIFICATION forming part of Letters Patent No. 255,044, dated March 14, 1882.

Application filed January 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, IRA T. SMITH, a citizen of the United States, residing at Mount Carmel, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Machines for Polishing the Eyes of Needles, of which the following is a specification.

This invention relates to certain improvements in machinery for polishing needle-eyes, the particular construction of my machine being pointed out in the following specification.

This invention is illustrated in the accompanying drawings, in which Figure 1 is a front view. Fig. 2 is a central longitudinal section. Fig. 3 is a central transverse section. Fig. 9 is a detached view of the needle-clamp. Figs. 4, 5, 6, 7, 8, 10 are details.

Similar letters indicate corresponding parts.

The needles the eyes of which are to be polished are first secured in a needle-clamp, when they are threaded with threads of suitable lengths, the threads being drawn through to the middle of their length. This clamp, with the threaded needles, is then inserted into the needle-clamp holder of the machine, the ends of the threads are secured to the thread-clamps, and after emery or other grinding material has been applied to said threads they are caused to pass rapidly to and fro through the needle-eyes in such a manner as to remove all the sharp corners, leaving the eye perfectly smooth and not liable to cut the thread when the needle is used for sewing.

The needle-clamp A (shown detached in Fig. 9) consists of two metal plates, *a b*, between which the needles are placed, when they are pressed together by the thumb-screw *c*, so as to hold the needles rigidly between them. The plate *a* is usually faced with leather or similar material to facilitate the holding of the needles.

The needle-clamp holder B into which the needle-clamp A, with its threaded needles, is inserted and fastened in a manner which will be hereinafter described, has three distinct simultaneous motions—first, up and down; second, a lateral; and third, a partly-revolving motion, the mechanism for producing which I will now in turn describe. First, the up-and-down motion: The needle-clamp holder B swings on two pivots, *d*, which project from the vertical slides C C′, fitted in grooves *e* on each side of the frame D. These slides receive their motion from two cams, *f f′*, acting on the roller-studs *g*, secured to the slides C C′. The cam *f* is secured to the flange *h*, and the cam *f′* to the worm-wheel *i*, each by a screw, *j*, working in a radial slot, *k*, which allows the cam to be adjusted, so as to alter its throw to correspond to the length of the needles to be worked upon. The flange *h* and the worm-wheel *i* are secured to the shaft E, which has its bearings in the frame and receives its motion by a worm, *l*, mounted on the driving-shaft G, which gears into the worm-wheel *i*. Thus, when the shaft E is caused to revolve the cams *f f′*, acting on the roller-studs *g*, raise and lower the slides C C′, between which the needle-clamp holder is hung. The lateral motion of the needle-clamp holder B is produced by an oscillating forked arm, *m*, one end of which straddles an annular recess, *n*, turned into the end of the needle-clamp holder, while the other end of the arm *m* is pivoted to a bracket, *o*, projecting from the inside of the vertical slide C, Fig. 3. Near its center the arm *m* is connected to a slotted plate, *p*, provided with roller-studs which are acted on by the cam *q*, mounted on an upright shaft, *r*, which has its bearings in brackets r' r^2, the brackets r' being secured to the slide C and moving with it, while the brackets r^2 are secured to the frame and remain stationary. One end of the plate *p* is held in place over the center of the cam by a screw, *s*, in the end of the upright shaft *r*, the slot *t* permitting it to move in obedience to the cam, while the other end is pivoted to the forked arm *m*, imparting to it the required oscillating motion. The upright shaft *r* is caused to revolve by a small spur-gear, *u*, which meshes into a larger gear, *v*, secured on the shaft E.

To enable the slides C C′, which carry the needle-clamp holder, to rise in obedience to the cams *f f′* without disengaging the mechanism just described for producing the lateral motion, it is constructed to rise with them, excepting the small spur-gear *u*, which is held in its position by the brackets r^2, both of which are secured to the frame. This gear is loosely mounted on the upright shaft *r* by a feather-key, which slides in a groove, r^4, in the shaft *r*,

thereby retaining its action while the rest of the mechanism is being raised or lowered. Thus the shaft E imparts motion to the raising and lowering mechanism and the mechanism for producing the lateral motion of the needle-clamp holder at one and the same time. The partly-revolving motion of the needle-clamp holder is produced by a toothed segment, *w*, which swings on a pivot, *a'*, in a bracket, *b'*, secured to the slide C', and consequently moves with it. Said segment engages with a small cog-wheel or another segment, *c'*, which is mounted on the end of the needle-clamp holder B, opposite the one which has the recess, thus turning the needle-clamp holder on the pivot *d*. This segment *w* receives an oscillating motion by a cam, *d'*, acting on roller-studs *e'* on the connecting-rod f^3, which is pivoted to the segment at *g'*. This cam *d'* is mounted on one end of a shaft, H, having its bearings in the frame D, while on the other end is mounted a worm-wheel, *i'*, to which motion is imparted by the worm *j'*, mounted on the driving-shaft G. Thus as the worms *l* and *j'* on the driving-shaft G cause the shafts E and H to revolve, all the three motions of the needle-clamp holder—viz., the rising-and-falling, the lateral, and the partly-revolving—are produced simultaneously.

The needles are so placed in the needle-clamp holder that their eyes are above the center of the pivots *d*, and when the needle-clamp holder turns the eyes of the needles describe an arc of a circle around the pivots *d*, thereby presenting their sharp edges to the action of the polishing-threads in a better manner than if they were in a line with the pivots, as has been done heretofore. After the needle-clamp A, with its threaded needles, has been placed in the needle-clamp holder B, the threads on one side are combed out to separate them and are secured to the thread-clamp I. Then the other side is treated in the same way and clamped to the thread-clamp J. These clamps I and J are pivoted at *t'* to a sliding table, K, which is guided in ways L on the top of the frame D, and under the inner end of each of them are placed tension-springs t^2, which have a tendency to turn the clamps backward on their pivots *t'*, thereby keeping the polishing-threads taut and preventing their entanglement. The thread-clamps I and J consist of two jaws, *l' l'* and *m' m'*, the former rigid, while the latter swing on pivots *n' n'*, and are acted on by eccentrics *o' o²*, which are pivoted at *p' p'*, and when turned in the proper direction press the upper edges of the movable jaws *m'* toward the jaws *l'*. These eccentrics are so shaped that when their handles are turned in the direction of arrow 1, or toward the back of the machine, the clamps are open, while if turned in the direction of arrow 2, or toward the front of the machine, the clamps are closed. (See Figs. 6 and 7.) When the threads have been combed or separated the ends of them are placed in the space *q'*, between the two jaws *l' m'*. The fillet-piece *s'* is then placed on them and the eccentric cam is turned, thereby clamping them firmly.

Behind the thread-clamp J and secured to the slide K is a cam, *w'*, and if the eccentric o^2 is turned so as to open the clamp J its handle glides up on said cam *w'*, thereby turning the clamp J forward in the direction of arrow 3, Fig. 6, against the action of the tension-springs t^2 and slackening the tension of the threads, so that the same can be removed and new ones inserted without difficulty. When this has been done the handle is again brought toward the front of the machine, so as to clamp the threads and expose the same to the action of the tension-springs t^2.

The revolving crank L' is mounted on one end of the shaft M, which has its bearing in the frame D, while on the other end is a bevel-gear, N, which meshes into a smaller gear, O, on the driving-shaft G. This crank L' is connected to the sliding table K by the rod *v'*, the oscillating lever *w'*, and the rod a^2, as shown in Fig. 2, imparting to it a reciprocating motion, which draws the polishing-threads which are clamped in the thread-clamps I and J at each end back and forward through the eyes of the needles in the needle-clamp holder B, while to the latter are imparted the three motions above stated, thereby bringing every portion of the surface of the needle-eye under the action of the polishing-threads.

The needle-clamp holder B is provided at each end with a hub, b^2, and flange c^2. The hubs are bored out to fit the pivots *d*, projecting from the vertical slides C C', and into one of them is turned the annular recess *n*, while on the other one is mounted the cog-wheel *c'*. Between the flanges is a movable jaw, d^2, which turns on a pivot, e^2, and into the flanges are cut recesses to receive the plate *a* of the needle-clamp A, and which serve as guides, so that the ends of the needles in the clamp A come between the body of the needle-clamp holder B and the movable jaw d^2, which is then pressed against them sufficiently to keep them in position during the process of polishing by the eccentric button f^2. (See Fig. 10.)

A shaft, P, with bearings in the frame D, runs across the machine from front to back, on one end of which, toward the front of the machine, is mounted a hand-wheel, Q, while on its rear end is secured the cam-wheel R. On the end of the driving-shaft G is mounted a friction-clutch, S, the loose disk of which forms a belt-wheel to transmit motion to the working parts of the machine, and which is controlled by the forked lever T, Figs. 1, 2, and 5, one end of which is pivoted to the frame at g^2, while its free end is held in contact with the edge of the cam-wheel R by the spring h^2. When the free end of the lever T is on one of the high portions of the cam-wheel R the two disks of the clutch are in gear, but when the lever T is on one of the low portions of the cam-wheel R the two disks are out of gear, and the loose one will run loosely on the driving-shaft G without setting the machine in motion. While the nee-

dle-clamp, with its threaded needles, is being inserted and the polishing-threads being properly clamped the lever T is on one of the low portions of the cam-wheel R, and the machine is at rest; but when the needles and polishing-threads have been properly adjusted, and it is desired to set the machine in motion, the hand-wheel Q is turned sufficiently to bring one of the high portions of the cam-wheel R under the lever T, thereby throwing the clutch into action, and starting the machine.

On the rear end of the shaft E is mounted a disk, U, in the edge of which are pins or projections i^2, which engage with similar pins or projections, j^2, on the face of the cam-wheel R. These pins or projections i^2 j^2 are so placed relatively to each other that the shaft E may make one or more revolutions before the cam-wheel R is sufficiently turned by them to bring one of the low portions under the lever T, which will again disengage the disks of the clutch S and stop the machine ready for the removal of the needle-clamp A with its threaded needles. Another clamp is then inserted, when the previous operation is repeated.

The advantages of my machine are that it is perfectly automatic, therefore requiring but slightly-skilled labor; that it will polish many more needles than the old machines; that the placing of the eyes of the needles away from the center of their motion, together with the peculiar motion of the needle-clamp holder, subjects the whole surface of the eye of the needle evenly to the action of the polishing-threads, producing uniformly smooth eyes, and the self-adjusting tension of the threads during the whole operation will prevent their breakage, while polishing every needle in the clamp evenly.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, substantially as herein-before described, of the needle-clamp, the thread-clamps, the needle-clamp holder, and mechanism, such as herein described, for imparting to the needle-clamp holder three distinct movements—viz., an up-and-down movement, a lateral reciprocating movement, and a partly-revolving or oscillating movement.

2. The combination, substantially as herein-before described, of the needle-clamp, the thread-clamps, the needle-clamp holder, and mechanism, substantially such as herein described, for imparting to the thread-clamps a longitudinal reciprocating movement and to the needle-clamp holder three distinct movements—viz., an up-and-down movement, a lateral reciprocating movement, and an oscillating movement.

3. The combination, substantially as herein-before described, of the table K, carrying the thread-clamps I J, mechanism for imparting to this table a reciprocating longitudinal movement, the slides C C′, fitted between the guides *e*, cams *f f′*, and shaft E, the needle-clamp holder B, supported by pivots *d*, secured in the slides C C′, the arm *m*, engaging with the needle-clamp holder, cam *q*, acting on said arm, and mechanism connected with the aforesaid shaft for operating the cam.

4. The combination, substantially as herein-before described, of the slides C C′, the needle-clamp holder B, supported on pivots *d*, which are fastened in said slides, gear-wheel *c′*, mounted on the needle-clamp holder, segment *w*, pivoted to the slide C′, cam *d′*, for imparting to this segment an oscillating motion, a shaft, G, and mechanism connected therewith for operating the said cam.

5. The combination, substantially as herein-before described, with the needle-clamp, the needle-clamp holder, the thread-clamps, the mechanism for imparting to the thread-clamps a longitudinal reciprocating motion, the mechanism for imparting to the needle-clamp holder three distinct movements of the cam-disk R, having pins j^2, a clutch mechanism controlled by said cam-disk for automatically stopping all the movements at the desired intervals, and a disk, U, having pins i^2, said parts being organized for operation substantially as described.

6. The combination, substantially as herein-before described, of the thread-clamp constructed of two jaws, *l′ m′*, a pivot, *t′*, on which said thread-clamp swings, the tension-springs t^2, the cam *u′*, and the eccentrics o^2.

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

IRA T. SMITH. [L. S.]

Witnesses:

ALLEN D. OSBORN,

CHARLES WHEELER.